

NOTES ON COCCID-INFESTING CHALCIDOIDEA—I.

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Amongst some insects bred this year from *Lecanium viride* on coffee in Mauritius, and forwarded to the Imperial Bureau of Entomology for identification by M. d'Emmerez de Charmoy, were two species of Chalcids belonging to the genera *Diversinervus*, Silv. (1915) and *Tetrastichus*, Hal. (1843) respectively. The former, which appears to differ considerably from the genotype, is here described as a new species; the latter so closely agrees with *Tetrastichus sicarius*, Silv., that I have not thought it advisable to propose a new name. My best thanks are due to Professor Silvestri for his kindness in examining preparations of both species.

***Diversinervus silvestrii*, sp. nov.**

A clear yellowish or honey-coloured species. The antennae and legs colourless in the main, except for a faint browning of the last joint of the club, the dorsal edge of the pedicel, narrowly on the dorsal edge and more broadly ventrally on the scape. The whole head, the apical half of the mandibles and the stipes brownish, a very faint brown spot near the apex of the mid femur on the underside and another corresponding to it on the same aspect of the tibiae near the base. Knees of the mid legs narrowly tinged with brown. On the hind legs is a moderately broad superior dark streak on the femur, and the tibia is brown apically and dorsally but without colour ventrally from before the apex to the base. Wings with the veins yellowish; the membrane tinted, obscurely clouded medianly, the basal triangle, an indefinite posterior spot at about two-thirds from the base along the hind margin, and round the apical margin more hyaline. The following regions of the thorax and abdomen are darker:—the posterior third of the mesonotum, the scutellum along the sides and towards the apex, the meso-pleurae posteriorly, the sides of the propodeon, the first tergite in front, and round about the stylets and the apex of the abdomen. The dark regions on the head and abdomen have in life a cupreous or violaceous metallic lustre.

Head in profile triangular, from the vertical aspect widely parabolic anteriorly, with a slightly concave ridged occipital edge (length to breadth about 9 : 14), a little wider than the thorax, distinctly wider than the abdomen and half as long as the latter together with the projecting part of the ovipositor, and as long as the sum of the scutellum, metanotum and propodeon. Along each orbit (from occiput to gena) are placed about eighteen short recurved bristles. Between the orbits (which diverge anteriorly) and dividing the area into three approximately equal strips are two rows of bristles (6-7 : 6-7). Lateral ocelli touching the orbits, the anterior ocellus being at the apex of an obtuse-angled triangle whose median is about one-sixth of the length of the head. Behind each posterior ocellus is a long stout bristle and between this pair and the occipital edge are four bristles (2 : 2) and about the same number in each angle formed by the edge and the orbit. Occiput distinctly concave. Frontal

aspect remarkably bare; no scapal groove; toruli widely apart, nearer to the inferiorly divergent orbits than to one another and just crossing the base line of the eyes, with 4-5 bristles between and one or two (irregular) above. Clypeus gently and broadly convex in the middle, with two clear pustules and a short slight flat lobe at each side.

Antennae: scape, pedicel, ring-joint, 6 funicular joints and 3 in club; length .47 mm., scape (20 : 7) over twice (12 : 5) the length of the pedicel (2 : 1), just shorter than the sum of the pedicel, ring-joint and first four funicular joints, or just longer than the entire funicle excluding the club; the latter five-sixths of the scape in length and a quarter broader. The funicle joints subequal (9, 8, 8, 7, 8, 10), the first joint as broad as long, all the others transverse, 2-4 just broader than long, 5 and 6 considerably expanded, 6 being half as broad again as long. Club distinctly swollen, twice as long as broad and $2\frac{1}{2}$ times as broad as the first funicular. The antenna has few sensoria, on the club 4-5, long and narrow, and apparently none on the funicle.

Mouth-parts: mandibles rather elongate, half as long again as the breadth at the base or three times that of the apex. The latter truncate, with three small teeth, the middle one broadest, the first smallest. The apical edge of the third (uppermost) tooth if produced touches the angle between the first and the second. Mainly on external apical third and above the ventral edge are about fifteen setigerous pustules. Stipes of first maxilla as long as the sum of the third and fourth joints of its palpus. The lateral bristle nearly half as long again as the first joint of the palpus. In the latter the joints are in ratio 9 : 9 : 8 : 14, and their breadths 4 : 5 : 6 : 6. The first and third are triangular, the second and fourth oblong, the latter with five bristles, three at the truncate apex, one of them twice the length of the joint itself, and one at each side. The galea bears 7-8 short apical bristles. The mid joint of the labial palpus is reduced to a narrow wedge and the joints are approximately 10 : 3 : 5, with a median breadth of 7. The longest apical bristle is nearly three times the joint.

Thorax: The general shape of the thorax and the chaetotaxy and sculpture of the mesonotum are seen in fig. 1. Pronotum in one piece, posterior edge evenly convex, not emarginate at the spiracle, two posterior rows of short bristles (8-10) and one or two single ones in front. Anteriorly the pronotum is semicircularly emarginate in the middle and just above this is a small chitinous knob raised a little from the general surface. The reticulation is transversely drawn out and much weaker on the upper portion of the overlap. Prosternum (4 : 5) with large scaly reticulation. The strong spine-like bristles on the mesonotum stand nearly erect, on the mid lobe there is a single row, on the scutellum two rows. In the figure these bristles have on one side been drawn flattened out to show their length. In conjunction with the peculiar furrowing of the notal surface, they possibly afford a hold to the male during pairing and the grooves may be comparable to similar structures in *Dytiscus* (Coleoptera). These grooves are derived from a much drawn out and raised reticulation of the mesonotum. Before the suture, about half the surface is so sculptured, the furrows being longitudinal; on the axillae and for a short space before the suture, the ridges are transverse. Near the posterior edge of the tegula, where it is in line with the suture, the surface is also grooved. The metanotum consists of two nearly separate, narrow grooved sclerites. Prepectus large, sterno-pleural surface nearly smooth, pattern faint and fine posteriorly. Upper margin of mesopleura in profile straight, without any

notch behind the middle. Propodeon on each side with a narrow striate triangular area in front of the spiracle in a plane parallel to the mid line of the scutellum. For the greater part the propodeon descends steeply and, seen from behind, is a smooth oblong ($5\frac{1}{2}:2$), with the spiracle at the anterior lateral angle and a large median peduncular emargination (fig. 1, *a*).

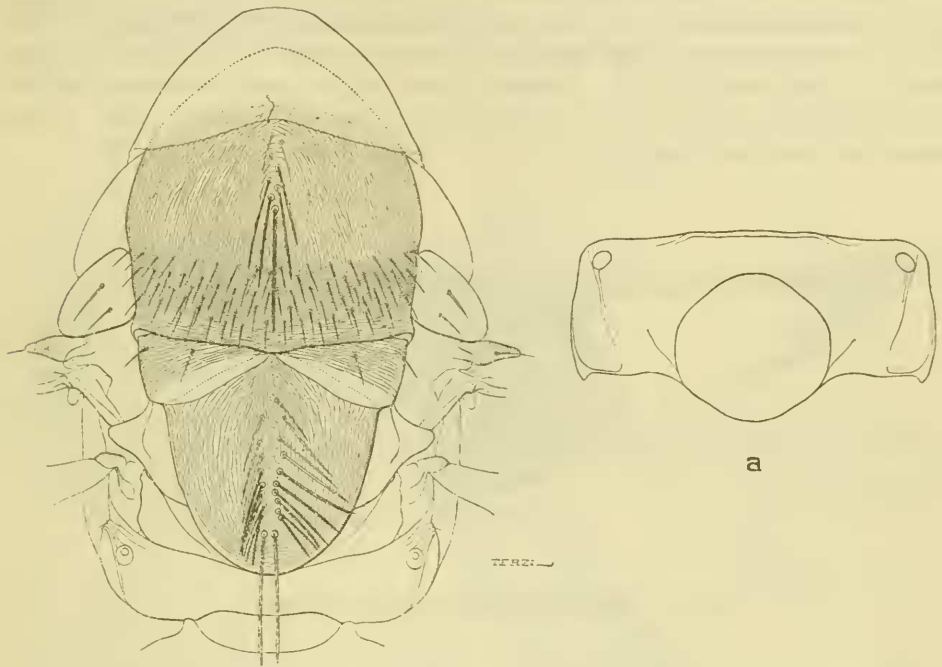


Fig. 1. Thorax of *Diversinervus silvestrii*, sp. n., ♀; *a*, propodeon from behind.

Wings: Fore wing (fig. 2) over three times as long as broad; length, .8 mm.; breadth, .25 mm. To give the proper effect the discal ciliation of the under as well as the upper surface for the distal two-thirds is shown. On the veins however only the bristles of the upper surface have been drawn except at the base of the radius where a conspicuous small black bristle (rising from below) is figured. The radius itself is bare, except for two subapical bristles, one at each side exactly on the edge. The hind wings are narrow, $3\frac{1}{2}$ times as long as broad; length (including cilia) .7 mm.; breadth, .2 mm. The faint embrowning extends from the end of the nervure over the apical third.

Legs: Fore legs, femur (4:1) anteriorly with a sub-dorsal row of 9-11 very short bristles, 3-4 longer median and 3-4 ventral on basal half. Posteriorly, two sub-ventral longer bristles on apical third and 4-5 more medianly. Tibia (7:2) short, about three-fourths of the femur, spur long and distinctly preapical. Between it and the insertion of the tarsus the comb contains five spines. First tarsal joint broad, with comb of 9 closely set spines. The first and the last joint are equal, and 2-4 are equal and half as long as 1. Mid legs elongate, slender, with femur normal, antero-posteriorly compressed. Coxae (3:2) with vertical row of 5-6 bristles, femur (13:2)

narrow, band-like, broadest subapically and nearly bare, there being a few bristles dorsally on both sides towards the apex. Of these 5-6, longer, run in a slanting row from beyond half on the dorsal edge to the lower apical angle on the anterior aspect. Tibia with an apical comb of 5-6 peg-like spines, spur just shorter than first tarsal joint. Tarsal joints (in ratio 26 : 17 : 12 : 12 : 23) with the following heavy spines respectively on the anterior edge :—6, 2, 2, 1, 0. Hind legs with the coxa very broad (8 : 9) and flat, with two long bristles above the trochanter and 4-5 in front ; femur (19 : 5) shorter than tibia, with a row of 6-8 ventral and subventral bristles. Tibia (11 : 2) : the upper apical angle bevelled off and the comb (10-11 spines) continued round it on the posterior edge. Anteriorly there are two spurs, both short, and the upper one about half the lower or one-third of the width of the tibia. Tarsal proportions nearly as in mid-leg, the first and second joints shorter (24 : 16).

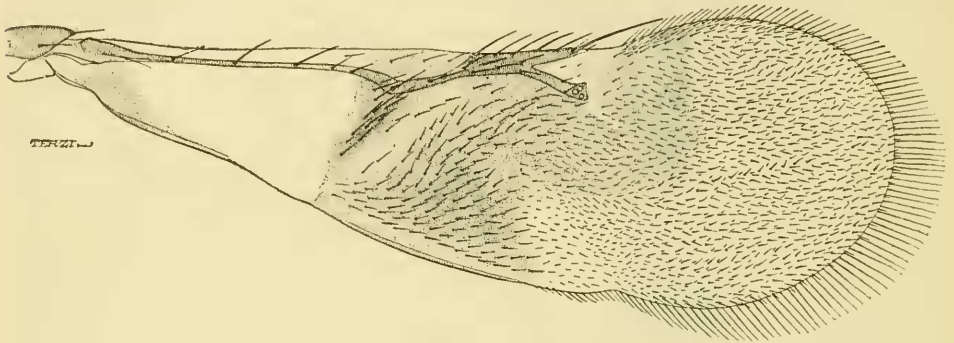


Fig. 2. Fore wing of *Diversinervus silvestrii*, ♀.

Abdomen shorter than thorax and about twice the head in length ; spiracle minute, circular. The tergites (2-6) bear at the sides (2-3, 2-3) widely separated bristles. Along the sides of the abdomen is a row of single bristles, two at most on each overlap (fused pleurite). Free portion of sheath $\frac{1}{4}$ of the base.

Length, 1.1-1.2 mm. ; alar expanse about 2 mm.

In *D. silvestrii*, sp. n., the club is broader and as long as the 5 preceding funicular joints and half of the sixth together. In *D. elegans* the club is narrower and as long as the 4 preceding joints and half of the fifth. In *silvestrii* only the first normal funicular joint is longer than wide, the rest being transverse, while in *elegans* the first 3 joints are cylindrical. In *silvestrii* the thorax as a whole is much longer than the abdomen, whilst in *elegans* the two are equal. In the fore wings of *silvestrii* the fringe is long ; there are 4 bristles below the submarginal distally, and the marginal plus the post-marginal bears 4-5 bristles besides the long apical one. In *elegans* the fringe is short, 22 bristles below the sub-marginal vein and 8 bristles, plus an apical stronger one, along the margin. In the mid-legs of *silvestrii* the tibia has an apical comb of 6 spines ; on the first tarsal joint are 3 pairs of short thick plantar spines, whilst at the apices of joints 2-4 are 1-2 similar spines. In *elegans* the tibial comb consists of 10 peg-like spines ; there are 8 pairs on the first tarsal joint and 4-5 spines on joints 2-4 apically.

Tetrastichus sicarius, Silv. (1915).

T. sicarius, Silvestri, Boll. Lab. Zool. R. Sc. Agr. Portici, IX (20th Feb. 1915), p. 325, figs. lxxiv-lxxv.

A short series, females only. Professor Silvestri, whose type was bred from *Chionaspis olivina*, Leonardi, from Nefasit, Eritraea, writes that in these Mauritius examples the funicle is a little longer than in his own specimens.

Coccophagus acanthosceles, sp. nov. (fig. 3).

An entirely blackish brown species, only the tarsi and the base of the abdomen obscurely paler.

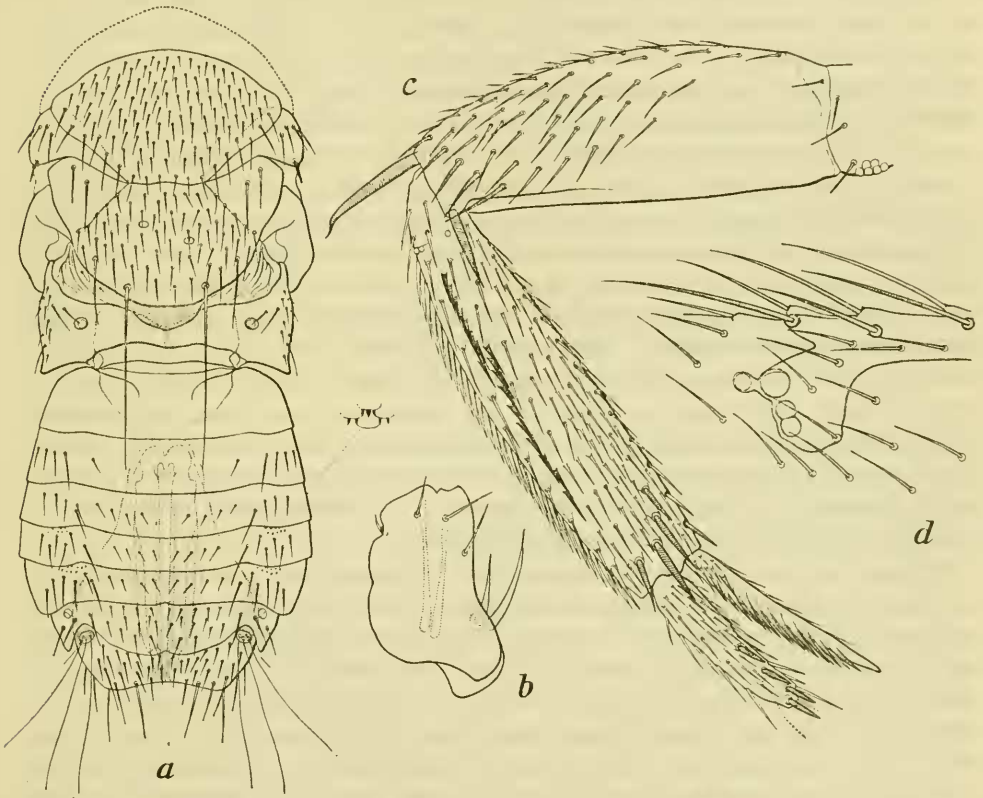


Fig. 3. *Coccophagus acanthosceles*, sp. n., ♀; (a) thorax and abdomen; (b) mandible; (c) mid-leg: femur, tibia, and first tarsal joint (anterior aspect); (d) radius.

♀. *Head* wider than deep (6:5). Eyes large, occupying three-fifths of the depth of the head and separated at the mid frons by exactly the diameter of either; closely set with small bristles, one of which rises at every alternate angle of the very regular hexagonal facets; the lower orbits are more divergent, and the lower angles of the eyes are one and four-fifths diameters apart. Below the anterior ocellus there is a narrow groove to shortly before one-half, where it meets the convergent post-scapal grooves of the upper portion of the scrobes, which form an inverted V; the sockets

themselves are oblong, quadrangular and narrowed slightly above. The antennae are set slightly above half-way between the base line of the eyes and the mouth-edge; the latter nearly straight, not re-entrant, with two slight obtuse prominences at the sides of the clypeus; genal keel obsolete, at most a trace at the lower corner of the eye. Reticulation of face fine, faint above the middle; below more definitely raised and drawn out parallel to the orbits and scapal hollows; between the scrobes more regular; on the bare occiput the pattern is larger and raised. Face very hirsute, over 100 short bristles on each side of the mid line between the anterior ocellus and mouth-edge, about a dozen between the scrobes, and over 20 on the clypeus.

Antennae: length $\cdot 38$, scape (nearly 3 : 1) as broad as the pedicel and nearly twice as long, but just shorter than (a) the club, or (b) the sum of the funicular joints, or (c) the pedicel and the first two of the funicle together; pedicel (10 : 7) longer than the first funicular joint, and half as long as the club; ring joint single, very minute; normal joints of funicle subequal (16 : 16 : 15), with a uniform breadth of 15; club swollen, in three subequal segments (14 : 12 : 13) with a maximum breadth of 20.

Mouth-parts: Mandibles shortly cut back rectangularly, both dorsally (more deeply) and ventrally, having a broad thin sharp straight-edged chisel-like apex; outer surface with three bristles behind the apex, and two stout spines, one ventral and basal in position, the other shorter, above, on the inner surface, where there are also two or three minute bristles, subapical and dorsal. The two internal ribs are long, equal, and gradually tapered. First maxilla with three short lateral stipes, and 3-4 other bristles; pattern large, a little raised; first joint of palpus bare, three-fifths of the second, which bears two bristles—one median and one pre-apical, besides a terminal slender spine nearly as long as the joint itself. The galea bears two to three short marginal bristles; second maxilla, labium a perfect oblong (10 : 7), palpus slightly exceeding (7 : 6) the basal joint of the maxillary palpus, with one median and a longer terminal bristle as long as the joint itself.

Thorax: all the bristles stiff and spine-like. Pronotum with a strong bristle above the nearly semicircular spiracular emargination, a posterior row of about 24 between and many others, more minute, in front. Mid-lobe: along each parapsidal furrow are 6-7 longer bristles and 4 others in front of the suture; besides these there are about 120 short bristles distributed evenly over the lobe, arranged in rows, but not distinctly in bilateral symmetry about the mid line. Side lobes: four bristles outside the furrows and one before the tegulae; axillae with two bristles; scutellum: situated on the posterior edge, which they divide into three approximately equal sectors, are two stout bristles one and a half times as long as the scutellum itself. In front of each, rather nearer to the posterior angle of the axilla, is an additional bristle, one-third of the length of the first pair; like the mid lobe, the scutellum is evenly covered with short bristles, but only half as numerous; the density on both areas is about the same. The pattern of the thoracic notum is indistinctly fine; transversely drawn out, and more distinctly raised transversely than longitudinally; the reticulation is thus somewhat scaly. Besides this pattern the whole integument when highly magnified shows numerous very minute close-set pustules or clear punctures. Metanotum: the post-scutellum broadly convex, rather flat, posteriorly declivous, projecting over the propodeon; its surface covered with large slightly raised cells, radiating from a clear, medio-basal spot, each ray consisting of not more

than two cells. Side-pieces each with two bristles, nearly smooth towards the post-scutellum, but laterally with four long complete transverse rugae, and others shorter, incomplete, between; propodeon narrow medianly, and declivous from the mid line towards the sides, but without a keel. The slopes of the notum without pattern, but crowded with minute pustules, descending to before the spiracle, where there is a straight, longitudinal, internal, rod-like thickening of the sclerite, but no external ridge or keel; just outside this thickening, nearly at one-half, is the small spiracle, with two bristles in front, and 3-4 in a flanking, longitudinal row, with 1-2 more below. The whole surface of this area is reticulate, hardly raised. Sternopleurae: presternite six-sided, very short and broad, with strong transverse pattern, bare; episternite helmet-shaped, with pattern of sternite; two minute bristles. The prepectora are broadly fused with a band which is not much wider laterally than on the smooth mid area. The pattern is large and coarse, 3-4 cells occupying the length and 10-12 the depth of the sclerite. The mesopleurae are very finely striate on their entire length—the striae (about 40 deep) consisting of long drawn-out cells.

Wings: Fore wings: two and one-third times as long as broad; length, .6 mm.; breadth, .26 mm.; marginal nearly twice as long as the submarginal. The latter bears six single bristles, with an additional pair before the clear pustules; the marginal is fringed by 14 bristles, and there are 12 equally strong on the vein parallel with the long axis of the latter, which bears besides numerous minute bristles; two bristles and four cells on the drop-like radius. Hind wings over three times as long as broad; length, .5 mm.; breadth, .15 mm.; about 20 fine short bristles along the marginal.

Legs: Fore-legs: coxae two-thirds as long as the femur, with coarse pattern on outer surface, three strong bristles on the ventral two-fifths in a perpendicular row and about a dozen minute ones at the same level behind; Femur (5:2) half as long again as the tibia, which folds up for its whole length against a deep, bare apical-ventral excavation in the former; anteriorly a few short bristles on the basal third, while above the groove the subdorsal surface is covered with bristles; posteriorly, two weak subapical median bristles and another stout subapical and ventral, with an irregular ventral or subventral row (8-9) reaching to the base; apical comb feebly developed, three bristles near the long broadly-curved spur whose apex crosses the tarsus at the ventral angle of the first joint; the latter with a comb of nine thin unequal spines, the lowermost being shorter. Midlegs: coxae (1:1) one-half the length of the femur, with coarser pattern than the fore coxae and similar chaetotaxy, bearing four stout bristles and about forty smaller; femur (3:1) with distinct pattern on both sides, the cells posteriorly subequal and large, anteriorly on the basal half and ventrally to near the apex they are long drawn out and the surface is bare; the distal half to below the mid line bears about 40 bristles, 3-4 at the apex stronger while there are 2 stout apical spines, the upper bent at the tip; tibiae (4:1) with four spines near the apex, the anterior surface covered thickly with small bristles; the entire dorsal edge with a close set row of short spine-like bristles, of which a second row, subdorsal, runs from the base to near the apex; the thickly feathered spur is one-third longer than the first tarsal joint. Hind legs: coxae (3:2) very large, broad and compressed, practically as long as the femur and nearly bare, there being only a few short bristles at the ventral angle; femur (2:1) similar to the mid femur,

with anteriorly a ventral row of about 12 short bristles, but with fewer bristles on the apical third—about 15 in all; tibiae (10 : 3) with two short subapical median spines, and one rather longer smooth apical dorsal spine, the closely appressed short spines covering more than one-third of the anterior subdorsal surface, and there being besides a subventral row of the same spines; two apical ventral spines about four-fifths as long as the first tarsal joint; the tibial comb consisting of 14 short hyaline spines.

Proportions of the tarsal joints :—

			i.	ii.	iii.	iv.	v.
Front	..	..	16	7	6	5	12
Mid	..	..	30	18	12	10	12
Hind	..	..	24	14	12	10	16

Abdomen : First tergite longest, and 1–3 subequal; 4 and 5 shorter; 6 postero-medianly a little incised, with minute spiracle. Tergites 3–5 bear complete post-medial rows of bristles; the sixth has three rows and the seventh four, there being about 40 bristles on the dorsal surface (excluding the overlapping portions behind the stylets, from which rise three long and one short bristles), of which 4, on the posterior edge in widely separated pairs (2 : 2), are longer. Especially on the basal tergites the pattern is faint, but stronger and scale-like posteriorly; the posterior sternites bear medianly many bristles.

Length, just over 1 mm.; alar expanse, 1·55 mm.

Type—a ♀ (on three slides) in the British Museum.

STRAIT SETTLEMENTS : Singapore (*J. H. Burkill*).

This specimen was extracted by Mr. E. E. Green from the body of a scale-insect (*Lecanium* sp.) occurring in hollow stems of a macaranga plant and sent to him by Mr. Burkill, the Director of the Botanic Gardens, Singapore.

Amongst the black or purplish or prevailingly dark brown species of *Coccophagus*, *C. acanthosceles* differs from *purpureus*, Ashm. (1886) and *orientalis*, How. (1896) in the hyaline wings, from *funeralis*, Gir. (1913) in the coloration of the legs, and from *immaculatus*, How. (1880) in the puncturation of the scutellum. In *oleophilus*, Silv. (1915) the scape is about three times as long as the pedicel, while the mandibles, mid tibiae and antennae separate the Singapore species at a glance from *princeps*, Silv. (1915). Dr. Masi has very kindly examined the type and reports that his *niger* (1909) belongs to a different section of the genus. In the antennal characters the new species possibly comes closest to *orientalis* and in the thorax to *princeps*, but it appears to be very distinct from anything yet described. The antennae and fore wings are short in the type; possibly in fully developed specimens they might be a little longer. The general coloration in life also is probably submetallic on the head and thorax.